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ABSTRACT

This digest addresses issues that should be considered in proposing technological solutions to the problems of public education. Although the potential benefits of the widespread application of media to instruction are supported, emphasis is on the need to define technology as a technique of designing instruction, rather than the more common perception of technology as machine. This definition implies the interaction of individuals, materials, and machines, in a variety of instructional settings and employing a variety of instructional strategies. Three basic patterns of media utilization are identified--additive, integrated, and independent--that have different potential effects on the cost and effectiveness of education. Conclusions stress that the achievement of excellence through the use of media requires capital investment in tools to allow the application of the "techniques" of educational technology, a reorganization of the structure of teaching and learning, and the will to do it. Five references are listed. (LMM)

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ERIC DIGEST

EXCELLENCE THROUGH EDUCATIONAL TECHNOLOGY: SOME PRIOR CONSIDERATIONS

The recent flood of studies decrying the lack of quality in public education (Goldberg and Harvey, 1984; Passou, 1984a, 1984b) is causing individuals in the field of educational media and technology to once again beat the drums for technology as a solution to the problems of public education (Gubser, 1983).

Current Applications of Educational Technology

Those who are familiar with current applications of media and technology do not require further evidence of the potential benefits to be derived from the widespread application of media to instruction. The ability of media to transmit instruction has been widely demonstrated:

- A few years ago, when blizzards and the energy crisis closed the schools in Columbus, Ohio, the mass media, working with teams of local educators, were able to maintain student progress by means of televised instruction coordinated with study guides published in local newspapers.
- Radio and television, via satellite distribution, are used to deliver instruction in developing countries and remote parts of the USA.
- Students from a number of engineering schools are currently attending classes in factories and offices by means of videotape cassettes.

Systems for Individualized Instruction

Progress in microelectronics and interactive videodisc systems has allowed the development of prototype instructional systems in which students work through learning tasks which are built around individual abilities and interests and which are designed to move the student toward established goals and objectives. Students make responses that are examined for errors and misunderstanding. Problems are diagnosed, and specific remedial instruction or elaboration is provided to correct the problems. Working through a series of successful, individually planned, interactive experiences, the "ideal" of education, in which each student is stretched to individual limits of achievement, is achieved. However, before such an ideal can be achieved in the typical classroom, certain factors must be taken into consideration.

The potential effectiveness of media is not found in any variables that are inherent in the devices (assuming they are capable of delivering the necessary stimulus), but in how the devices are used. This implies that technology is a technique of designing instruction rather than the more common perception of technology as machine. This broad definition of technology implies the interaction of individuals, materials, and machines in a variety of instructional settings and employing a variety of instructional strategies—each item of the mix being called upon to do what it does most effectively.

Patterns of Media Utilization

Three basic patterns of media utilization, each of which has different potential effects on the cost and effectiveness of education, currently exist—additive, integrated, and independent (Wilkinson, 1980).

In the *additive* approach, materials are added to regular instruction as supplementary or enrichment activities and are not necessary for the achievement of basic instructional outcomes. The use of media is dependent on the classroom teacher, does not have a significant impact on student achievement, and represents an added expense for the educational system. Such an approach is not cost-effective.

In the *integrated* approach, carefully selected or produced materials are integrated into regular instruction and provide an essential element leading to the achievement of basic instructional outcomes. Media and the teacher are mutually dependent—each doing what it does best. This approach represents an additional cost for the school system and requires extensive planning and preparation on the part of the teacher, but has the potential of creating a significant increase in student achievement.

In the *independent* approach, instruction is redesigned so that basic instructional outcomes are achieved through the active interaction of students and instructional materials without the direct intervention of the classroom teacher. Although this approach represents a major initial cost to the school system, it has the greatest potential for increasing the cost-effectiveness of education.

Enhanced Use of Learning Time

The effectiveness of time spent in learning should be increased. A major cause of ineffective time use is the "batch processing" approach to instruction. Although education is one of the most labor-intensive "industries" in existence, it provides little opportunity for individual work with students. Faced with a class of 25 to 35 students, the teacher is forced to direct attention to groups of students rather than individuals.

A possible solution to this problem would be to significantly reduce class size. However, the increased number of teachers required for such a solution, along with the necessity of increasing salaries to a level sufficient to attract more qualified teachers, would increase the costs of education beyond any hope of taxpayer approval.

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An alternative, less expensive solution would be to redeploy teachers through using media. Such an approach is based on the demonstrated effectiveness of media to transmit conventional instruction and employ a combination of integrated and independent use of media.

Using this approach, students spend a major portion of their time either receiving basic information in a large-group setting by means of television or working on individual activities by means of microcomputers. In both cases, direct supervision is provided by paraprofessionals. Different instructional approaches and levels of materials are developed for, and presented to, different groups of students. Teachers, thus freed from basic presentation of instruction and supervision, devote their time to small-group activities and to individual interaction with students. Under this strategy, students would spend less actual time in the presence of the teacher but the quality and effectiveness of the time would be greatly enhanced.

Conclusions

Using media and technology to redeploy teachers requires a reorganization of the school and redefinition of the teacher's role—teachers must shift from being dispensers of knowledge to being managers of learning. Although no fully developed examples of such systems exist in the United States, such programs have been organized in underdeveloped nations where a shortage of trained personnel has made traditional patterns of instruction impossible, and in the extension programs of many higher education institutions.

What is necessary, in order to achieve excellence through the use of media, is the capital investment in tools to make possible the application of the "techniques" of educational technology, a reorganization of the structure of teaching and learning, and the will to do it.

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